## COMMENTS AND RESPONSE

In view of the comments below, Applicants respectfully requests that the Examiner reconsider the present application including rejected claims, as amended, and withdraw the claim rejections.

### *Information Disclosure Statement*

The Examiner noted that he has not considered the information disclosure statement filed on November 11, 2000, because it fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP §609, because the status of the applications listed the IDS are not updated and not used in From PTO 1449.

Applicants have corrected this in an information disclosure statement filed on May 27, 2004, which properly identifies each of the documents cited in the information disclosure statement filed on November 11, 2000. Applicants respectfully request that the Examiner consider these documents and initial the properly-submitted form PTO-1449.

### *Claim Objections*

The Examiner has objected to claims 1-84 based on a number of informalities. By this response, Applicants have addressed these objections.

With respect to claims 1, 8, 27, 32, 35, 38, 48, 52, and 60, the Examiner has required that the first use of the term UWB in a claim group be changed to --ultra wide bandwidth (UWB)--. Although claims 53 and 79 were not specifically cited in this objection, Applicants believe that this objection was meant to cover these claims as well, since they include the abbreviation "UWB." By this response, Applicants have made the changes recommended by the Examiner.

With respect to claim 2, line 1, the Examiner has asserted that the term "Claim1" should read "Claim 1". By this response, Applicants have made this change.

With respect to claim 33, line 1, the Examiner has asserted that the reference "31" should read –32--. By this response, Applicants have made this change.

Therefore, based on these claim amendments, Applicants request that the Examiner withdraw the objection to claims 1-84.

Applicant would like to point out that claims 1, 2, 8, 27, 32, 33, 35, 38, 48, 52, 53, 60, and 79 were amended in response to an outstanding objection to the drawings and not due to a substantial reason related to patentability or any other reason that might give rise to estoppel. Therefore, the amendments to claims 1, 2, 8, 27, 32, 33, 35, 38, 48, 52, 53, 60, and 79 have not narrowed the scope of these claims within the meaning defined in Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722 (2002).

***Rejections 35 USC § 103***

The Examiner has rejected claims 1-3, 6, 8, 9, 17, 23, 32, 33, 35, 38, 45, 52-55, 59-61, 69, and 75 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Withington et al.(IEEE, 1999) ("Withington"), in view of United States Patent No. 5,642,377 to Chung et al. ("Chung"). Applicants respectfully traverse this rejection.

Claim 1 recites identifying an in-band measure of a signal to noise ratio of an incoming UWB signal; comparing the in-band measure of signal to noise ratio identified in the identifying step with an in-band signal to noise ratio threshold; and transitioning between the acquisition mode and the tracking mode when in the comparing step it is determined that the in-band

measure of signal to noise ratio has satisfied a predetermined criteria relative to in-band signal to noise ratio threshold.

The Examiner has asserted that Withington discloses an ultra-wideband receiver comprising a controller for controlling transitions between synchronization states that include an acquisition mode and a tracking mode based on SNR. Applicants respectfully traverse this characterization of Withington.

The receiver device disclosed in Withington is an ultra-wideband scanning receiver that allows precision measurement of the impulse response of a channel. This receiver includes two correlators: a tracking correlator and a scanning correlator. The tracking correlator varies the phase of an internally coded template until it synchronizes and is able to track a received pulse train. The scanning correlator can sample a received waveform at precise time delays relative to a tracking point. By successively increasing the time delay while sampling the waveform, a complete, time-calibrated picture of the waveform can be collected. (See, e.g., Withington, page 1188, first column, first and second paragraphs.) However, nothing in Withington discloses the use of separate acquisition and tracking modes, nor does anything in these documents disclose transitioning between an acquisition mode and a tracking mode based on a comparison of any kind of an SNR measurement, as required by claim 1.

In fact, Withington discloses that at the same time the scanning correlator is capturing waveform data, samples from the tracking correlator are also being collected. Samples from the scanning correlator and the tracking correlator are collected in pairs so that events in the waveform sample set are time correlated with events in the data symbol set. (See, e.g., Withington, page 1188, first column, third paragraph.) Thus, the scanning correlator and the tracking correlator operate at the same time, not alternatively. Thus, nothing in Withington

discloses operating in separate tracking or acquisition modes, much less transitioning between the two.

In contrast, the scanning receiver of Withington operates in a single mode to measure the impulse response of the environment between any two locations within the communication range of a radio link. This response data can then be used to guide the selection of signal acquisition and tracking algorithms. (See, e.g., Withington, page 1188, second column, first full paragraph.)

Furthermore, while symbol data captured from the tracking channel can be used to calculate the SNR for a tracking point, nothing in Withington discloses using an SNR measurement to facilitate the transition between two operation modes. And while Withington does disclose that an SNR measurement can be used to allow the benefit of coherent (rake) combining of multiple signal paths to be estimated. (See, e.g., Withington, page 1188, second column, third full paragraph), this is not the same as transitioning modes based on an SNR estimate and comparison.

Thus, Withington operates in a single mode during which it makes a number of measurements and estimations about a local channel environment. It does not operate in separate tracking or acquisition modes, but rather operates continuously to provide its measurements and estimations. Since it does not operate in separate modes, it does not disclose or suggest transitioning between any modes.

The Examiner then asserts that Chung specifically discloses comparing the in-band measure of signal to noise ratio identified in the identifying step with an in-band signal to noise ratio threshold, and transitioning between the acquisition mode and the tracking mode when in the comparing step it is determined that the in-band measure of signal to noise ratio has satisfied

a predetermined criteria relative to in-band signal to noise ratio threshold. Applicants respectfully traverse this characterization of the teachings of Chung.

First, Chung does not compare an in-band measure of signal to noise ratio (SNR) with an in-band SNR threshold, as recited in claim 1. Although Chung does disclose how a real time SNR estimate can be determined (See, e.g., Chung, column 13, lines 21-27), this is not the same as comparing the SNR estimate with an SNR threshold.

In fact, the only threshold comparisons that Chung discloses are with signal detection thresholds $T_{SD1}$ and $T_{SD2}$, signal classification thresholds $T_{SC1}$ and $T_{SC2}$, and a noisy bin threshold $C_N$. (See, e.g., Chung, column 5, lines 31-57, column 7, line 4, through column 10, line 45, and FIG. 2.) But these thresholds are not SNR thresholds, nor is an SNR estimate compared with these thresholds. Rather, the signal detection thresholds $T_{SD1}$ and $T_{SD2}$ and the signal classification thresholds $T_{SC1}$ and $T_{SC2}$ are measured against the outputs $Z_1$ and $Z_2$ from first and second integrators 12 and 26, i.e., they are measured against first and second integrated signal energy outputs. The noisy bin threshold $C_N$ is measured against the count $c_n$ of the noisy bin counter 20. None of these are SNR comparisons.

Chung discloses that the system of the invention uses a signal dependant adaptive optimal threshold by exploiting the SNR of the communication environment in real time. (See, e.g., Chung, column 5, line 64, through column 6, line 1.) But adapting signal energy thresholds by exploiting a real-time SNR measurement is not the same as comparing an in-band measurement of SNR with an in-band SNR threshold, as recited in claim 1.

Second, Chung discloses an *acquisition* system. It does not disclose the use of a tracking mode. And since it does not disclose separate acquisition and tracking modes, it also does not disclose any way by which a receiver transitions between two such modes.

Third, even if Chung did disclose separate acquisition and tracking modes, it does not disclose transitioning between such modes based on a comparison between an in-band measure of SNR and an in-band SNR threshold, as required by claim 1. As noted above, the only thresholds that are used in Chung are integrated signal energy thresholds and a noisy bin threshold. And the integrated signal energy thresholds comparisons made in the comparator 14, comparator 16, comparator 28, and comparator 29 are used to set the various thresholds and the noisy bin counter $c_n$. (See, e.g., Chung, column 7, line 4, through column 10, line 45, and FIG. 2.) They are not used to transition the system between modes.

Claims 2, 3, and 6 depend variously from claim 1 and are allowable for at least the reasons given above for claim 1.

In addition, claim 3 further recites that the transitioning step includes transitioning between modes each time it is determined in the comparing step that the in-band measure of signal to noise ratio has either surpassed, or dropped below the in-band signal to noise ratio threshold. Since Withington and Chung, alone or in combination, fail to disclose or suggest transitioning between modes a single time, they likewise fail to disclose multiple transitions.

Claim 6 further recites that the transitioning step includes transitioning from an acquire mode to one of a predetermined number of alternative track states in a track mode. Nothing in Withington or Chung, alone or in combination, discloses or suggests the use of multiple tracking states. As noted above, neither of these documents discloses any sort of track mode, much less multiple track states in a track mode.

Claim 8 recites identifying at least two parameters that combine to form an indirect measure of a signal to noise ratio of an incoming UWB signal; determining a control threshold parameter from a mathematical combination of the at least two parameters; and transitioning

between the acquisition mode and the tracking mode when the control threshold is set to a predetermined value.

Withington and Chung fail to disclose or suggest every feature of claim 8 for reasons analogous to those given above for claim 1. Just as they do not disclose transitioning between modes based on an SNR threshold, they likewise do not disclose transitioning between modes based on parameters that form an indirect measure of SNR.

In addition, they also do not disclose or suggest both identifying at least two parameters that combine to form an indirect measure of a signal to noise ratio of an incoming UWB signal, and determining a control threshold parameter from a mathematical combination of the at least two parameters, as recited in claim 8.

The Examiner has asserted that the two parameters that combine to form an indirect measure of SNR are $T_{SD}$ and $E(z|H_0)$. However, if these are the two recited parameters, then Chung fails to meet the limitations of determining a control threshold parameter from a mathematical combination of the at least two parameters. In other words, Chung does not disclose determining a control threshold parameter from a mathematical combination of $T_{SD}$ and $E(z|H_0)$, as would be required of claim 8 if $T_{SD}$ and $E(z|H_0)$ were the recited at least two parameters.

Claims 9, 17, and 23 depend from claim 8 and are allowable for at least the reasons given above for claim 8.

In addition, claim 23 recites that the transitioning step includes transitioning between a predetermined number of alternative track states. This is not disclosed or suggested in

Withington or Chung, alone or in combination. Since they do not disclose a single track state, they do not disclose multiple track states.

Claim 32 recites a control mechanism configured to control a transition between an acquire state machine and a track state machine when an in-band measure of signal to noise ratio satisfies a predetermined condition. This feature is neither disclosed nor suggested in Withington or Chung, alone or in combination.

Withington does not disclose this feature for reasons analogous to those given above for claim 1. The device disclosed in Withington does not employ separate acquisition and tracking modes or state machines, and so does not have any element that is configured to control a transition between an acquire state machine and a track state machine. Furthermore, as noted above, although Withington does employ an SNR measurement, it does not use that SNR measurement to control a transition between modes or state machines.

Chung also does not disclose this feature for reasons analogous to those given above for claim 1. The Examiner has asserted that this feature is shown in Chung at column 14, lines 14-34 and from column 13, line 21, through column 14, line 20. Applicants respectfully traverse this characterization of Chung.

As described in these portions of the specification, Chung is directed to an acquisition system. It does not disclose or suggest anything related to tracking, as defined in Applicants' specification. Chung, at column 4, lines 1-34, describes how by combining features of a conventional maximum likelihood approach and a serial search approach an acquisition system can achieve faster acquisition than either approach individually, with improved accuracy in synchronization detection and more reliability and controllability. Chung from column 13, line

21, through column 14, line 20, describes the advantages of the improved acquisition system over prior art implementations.

Nothing in either of these descriptions discloses or suggests switching to a track state machine when an in-band measure of SNR satisfies a predetermined condition. First, they describe only acquisition, not tracking. Second, since no tracking is shown, they also show no transition from acquisition to tracking. Third, although they do show that an SNR estimate can be made, they further disclose that this SNR estimate is used to set a threshold, not to transition from one state machine to another.

Claim 33 depends from claim 32 and is allowable for at least the reasons given above for claim 32.

In addition, claim 33 further recites that the track state machine comprises a processor configured to determine the in-band measure of the signal to noise ratio of the incoming UWB signal and calculate whether the in-band measure of signal to noise ratio satisfies a predetermined criteria that corresponds with a predetermined bit error rate. Nothing in Withington or Chung, alone or in combination, discloses or suggests this feature. In particular, neither document discloses a processor that calculates whether an in-band measure of SNR satisfies a criterion that corresponds to a predetermined bit error rate (BER). The Examiner has asserted that this is shown in Chung at column 14, lines 14-34 and from column 13, line 21, through column 14, line 20, but neither of these passages refers to the BER at all.

Claim 35 recites a means for identifying an in-band measure of a signal to noise ratio of an incoming UWB signal; a means for comparing the in-band measure of signal to noise ratio with an in-band signal to noise ratio threshold; and a means for controlling a transition between

the acquisition mode and the tracking mode when said means for comparing identifies that the in-band measure of signal to noise ratio has satisfied a predetermined criteria.

This claim is allowable for reasons analogous to those given above for claim 1. Just as Withington and Chung, alone or in combination do not disclose or suggest the steps of claim 1, so too do they fail to disclose means for implementing those steps.

Claim 38 recites means for identifying at least two parameters that are an indirect measure of a signal to noise ratio of an incoming UWB signal; means for determining a control threshold parameter L from a mathematical combination of the at least two parameters; and means for transitioning between the acquisition mode and the tracking mode when the control threshold parameter L is set to a predetermined value by said means for determining.

This claim is allowable for at least the reasons given above for claim 8. Just as Withington and Chung, alone or in combination do not disclose or suggest the steps of claim 8, so too do they fail to disclose means for implementing those steps.

Claim 45 depends from claim 38 and is allowable for at least the reasons given above for claim 38.

In addition, claim 45 recites that the means for transitioning includes means for transitioning between a predetermined number of alternative track states. This is not disclosed or suggested in Withington or Chung, alone or in combination. Since they do not disclose a single track state, they likewise do not disclose multiple track states.

Claim 52 recites a means for controlling a transition between the acquisition mode and the tracking mode when the estimate of signal to noise ratio satisfies a predetermined condition.

This claim is allowable for reasons similar to those given above for claim 1. Since neither Withington and Chung, alone or in combination, disclose both acquisition and tracking modes,

they likewise do not disclose a means for controlling a transition between two such modes, as recited in claim 52.

Claim 53 recites a computer program product having computer readable instructions that when executed by the processor perform steps of identifying an in-band measure of a signal to noise ratio of an incoming UWB signal; comparing the in-band measure of signal to noise ratio identified in the identifying step with an in-band signal to noise ratio threshold; and transitioning between the acquisition mode and the tracking mode when in the comparing step it is determined that the in-band measure of signal to noise ratio has satisfied a predetermined criteria relative to in-band signal to noise ratio threshold.

This claim is allowable for reasons analogous to those given above for claim 1. Just as Withington and Chung, alone or in combination do not disclose or suggest the steps of claim 1, so too do they fail to disclose a computer program product having computer readable instructions that when executed by a processor perform those steps.

Claims 54, 55, and 59 depend from claim 53 and are allowable for at least the reasons given above for claim 53.

In addition, claim 54 further recites that the computer program product comprises computer readable instructions that when executed by the processor implement a step of calculating a proxy for an actual signal to noise ratio. Nothing in Withington and Chung, alone or in combination discloses or suggests calculating a proxy for SNR.

Claim 55 further recites that the transitioning step includes transitioning each time it is determined in the comparing step that the in-band measure of signal to noise ratio has either surpassed, or dropped below the in-band signal to noise ratio threshold. Since Withington and

Chung fail to disclose transitioning between an acquisition mode and a tracking mode one time, they also fail to disclose transitioning multiple times.

Claim 59 further recites transitioning from the acquisition mode to one of a predetermined number of alternative track states in the track mode. Nothing in Withington or Chung, alone or in combination, discloses or suggests the use of multiple track states. As noted above, neither of these documents discloses a single track state, much less multiple track states.

Claim 60 recites a computer program product having computer readable instructions that when executed by the processor perform steps of identifying at least two parameters that are an indirect measure of a signal to noise ratio of an incoming UWB signal, determining a control threshold parameter from a mathematical combination of the at least two parameters, and transitioning between the acquisition mode and the tracking mode when the control threshold is set to a predetermined value in said determining step.

This claim is allowable for at least the reasons given above for claim 8. Just as Withington and Chung, alone or in combination do not disclose or suggest the steps of claim 8, so too do they fail to disclose a computer program product having computer readable instructions that when executed by a processor perform those steps.

Claims 61, 69, and 75 depend from claim 60 and are allowable for at least the reasons given above for claim 60.

In addition, claim 75 further recites that the computer program product contains instructions that when executed by a processor perform a step of transitioning between a predetermined number of alternative track states. Nothing in Withington or Chung, alone or in combination, discloses or suggests the use of multiple track states. As noted above, neither of these documents discloses a single track state, much less multiple track states.

Furthermore, even if Withington and Chung did disclose all of the elements recited in the rejected claims, the Examiner has not provided sufficient motivation to combine the teachings of Chung with those of Withington. All that is provided in the rejection after a recitation of what Withington and Chung allegedly show are the blanket assertions that "it would be desirable to have more accuracy, more reliability, and more controllability in detection of synchronization in a communications system" and that "it would have been obvious to one of ordinary skill in the art at the time of the invention to employ the method and the controller of controlling a transition between the acquiring mode and the tracking mode as taught by Chung et al in the UWB receiver of Withington in order to allow the receiver to have more accuracy, more reliability, and more controllability in detection of synchronization."

It is not sufficient to maintain a rejection, however, for the Examiner to simply identify each claimed element in cited references and then assert that the combination of these elements meets a general desire for improved performance. Rejecting claims based solely on the desirability for improved performance along with the Examiner finding corollaries for the claimed elements would permit the Examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. And such an approach is not permissible.

In order to prevent the use of hindsight based on the invention, the Examiner must show a true motivation to combine the cited elements – some reason that a skilled artisan confronted with the same problems as the inventor and with no knowledge of the claimed invention would select the elements from the cited prior art references for combination in the manner claimed. But it is not sufficient for the Examiner to issue a simple invocation of skill in the art or the general desirability of improved performance. If such a rote invocation were sufficient to supply a

motivation to combine, most areas of technology would rarely experience a patentable technical advance. The requirement of a suggestion to combine stands as a critical safeguard against hindsight analysis and rote application of the legal test for obviousness.

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. And the general assertion made by the Examiner that it would be desirable to have more accuracy, more reliability, and more controllability in detection of synchronization does not provide such motivation. In fact, the portion of Chung cited by the Examiner as providing motivation (column 4, lines 30-34) notes that by combining features of a conventional maximum likelihood approach, a serial search approach, and a system disclosed in a co-pending application, in an appropriate way, the approach disclosed in Chung already achieves faster acquisition as compared to both of the conventional maximum likelihood and serial search approaches, has more accuracy in detection of synchronization as compared to the conventional serial search approach, and more reliability and controllability as compared to the system of the co-pending application. Thus, there is nothing in this passage that provides any motivation to further alter the system disclosed in Chung.

Because the Examiner did not provide anything beyond a general assertion of motivation to combine, based on the Examiner's skill in the art, Applicant asserts that the Examiner engaged in hindsight analysis, improperly using Applicant's own claimed invention to provide the motivation to combine the cited references.

Therefore, based on at least the reasons given above, Applicants respectfully request that the Examiner withdraw the rejection of claims 1-3, 6, 8, 9, 17, 23, 32, 33, 35, 38, 45, 52-55, 59-61, 69, and 75 under 35 U.S.C. § 103(a) as being allegedly anticipated by Chung.

***Allowable Subject Matter***

The Examiner indicated that claims 27-31, 48-51, and 79-84 would be allowable if rewritten to overcome the objections set forth in this Office Action.

By this response, Applicants have amended the claims to overcome these rejections. This places claims 27-31, 48-51, and 79-84 in a condition that the Examiner has indicated would be allowable.

The Examiner has indicated that claims 4, 5, 7, 10-16, 18-22, 24-26, 34, 36, 37, 39-44, 46, 47, 56-58, 62-68, 70-74, and 76-78 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten (1) in independent form including all the limitations of the base claim and any intervening claims, and (2) to overcome the objections set forth in the section of claim objections in this Office Action.

By this response, Applicants have amended the claims to overcome the objections set forth in the section of claim objections in this Office Action. However, because they assert that independent claims 1, 8, 32, 35, 38, 52, 53, and 60 are all allowable, they have not amended claims 4, 5, 7, 10-16, 18-22, 24-26, 34, 36, 37, 39-44, 46, 47, 56-58, 62-68, 70-74, and 76-78. Applicants assert that claims 4, 5, 7, 10-16, 18-22, 24-26, 34, 36, 37, 39-44, 46, 47, 56-58, 62-68, 70-74, and 76-78 are dependent upon allowable base claims and should therefore be allowable without amendment.

***Claim Amendments***

By this response, Applicants have made minor clerical changes to claims 6, 53, 54, and 59.

Regarding claims 6 and 53, Applicants have changed the term "acquire mode" to read --acquisition mode.--

Regarding claims 54, Applicants have changed the term "the step of calculating a proxy" to read --a step of calculating a proxy.--

Regarding claim 59, Applicants have changed the term "a predetermined number of alternative track states" to --one of a predetermined number of alternative track states.--

The above amendments made to claims 6, 53, and 54 were made in order to improve the cosmetic appearance to these claims and not due to a substantial reason related to patentability or any other reason that might give rise to estoppel. Therefore, the above amendments to claims 6, 53, and 54 have not narrowed the scope of these claims within the meaning defined in Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722 (2002).

***Conclusion***

Accordingly, Applicants respectfully submit that the claims, as amended, clearly and patentably distinguish over the cited references of record and as such are deemed allowable. Such allowance is hereby earnestly and respectfully solicited at an early date. If the Examiner has any suggestions, comments, or questions, calls are welcome at the telephone number below.

Although it is not anticipated that any additional fees are due or payable, the Commissioner is hereby authorized to charge any fees that may be required to Deposit Account No. **50-1147**.

Respectfully Submitted,

Brian C. Altmiller
Reg. No. 37,271

Date: August 26, 2004

Posz & Bethards, PLC
11250 Roger Bacon Drive
Suite 10
Reston, VA 20190
Phone (703) 707-9110
Fax (703) 707-9112
Customer No. 23400